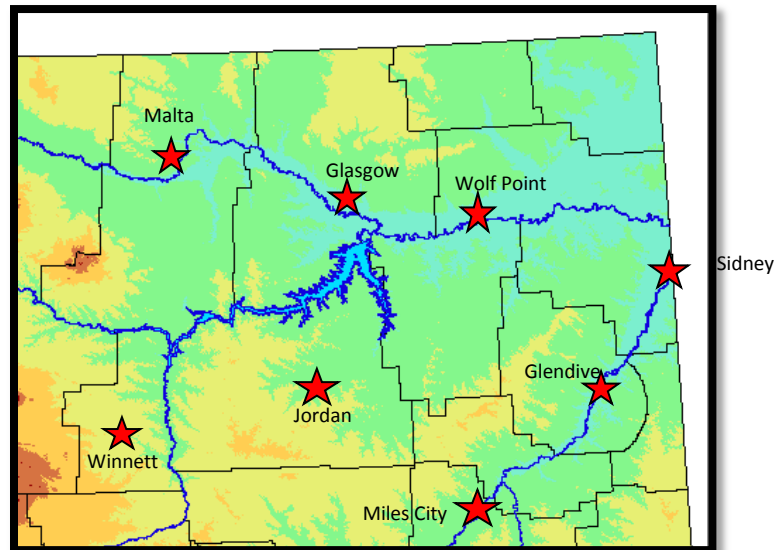


Northeast Montana 2011 Spring Flood Summary

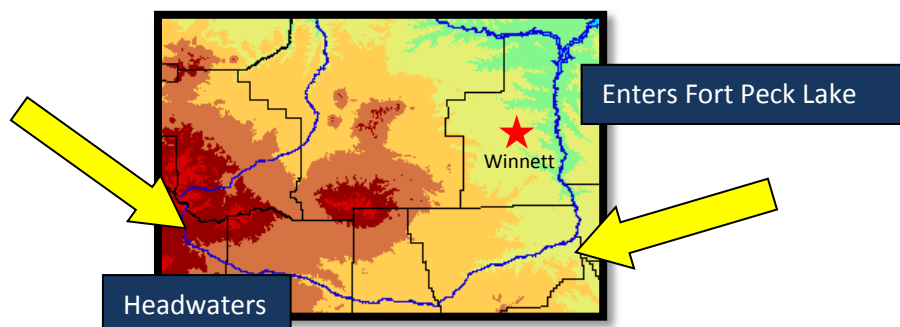
NWS Glasgow

A record breaking snowfall year at many locations in northeast Montana, lead to significant flooding in April 2011. Record breaking rainfall on already saturated ground lead to a second round of flooding across much of the area in May and June 2011, and record floods occurred. Four river basins had moderate to major flooding occurring, for nearly 3 months on and off. This summary will start with the first basin to experience flooding, and end with the last basin to experience flooding.



NWS Glasgow County Warning Area

Musselshell River:

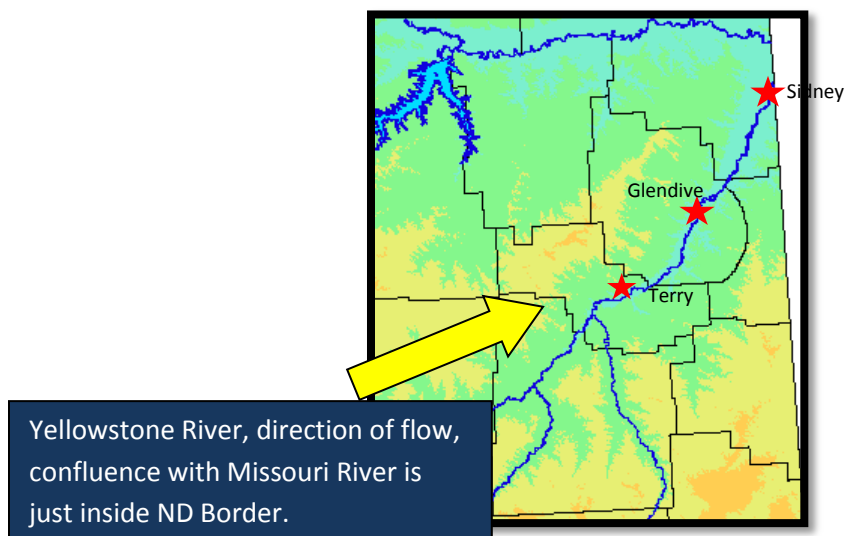


This area sees warmer temperatures due to Chinook winds from the mountains to their west. Warm temperatures at the end of January lead to snow melting, and the ice on the Musselshell River to break up and cause ice jams on January 28-30, 2011 near the Highway 200 Bridge and upstream. A small stock dam also started to fail in northern Petroleum County, and the water caused damage to a downstream road and culvert. By early February, it had turned colder again, and the river refroze, and

the dam also froze over. On February 14-19, 2011 snowmelt on top of the old ice jam led to more flooding. Many of the ice cakes receded as the snowmelt ended, and stayed in the channel into March. On March 12-20, 2011, more snowmelt led to another round of ice jams. The next round of flooding was due to heavy rain, from May 10-14, 2011. The next round of flooding was the longest, due to the continued heavy rainfall and flash flooding downstream on the river and its tributaries. It started on May 20, 2011 and continued through June 28, 2011.

Flood stage at Mosby/Hwy 200 Bridge is 8 feet. The peak flood was at 16.00' on May 23, 2011. This river experienced flooding on and off for nearly 6 months, and there were many roads and homes impacted by flooding during this time.

Yellowstone River:

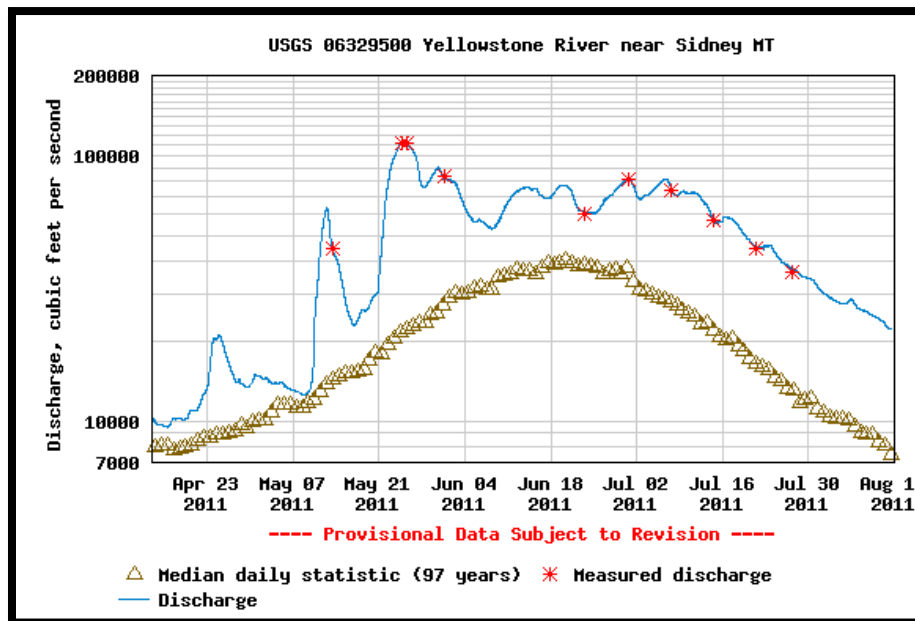


Ice jam flooding started occurring in March. On March 14-18, 2011 an ice jam occurred in Glendive, MT. The peak stage was 55.85 feet, the 11th highest on record (flood stage is 53.5 feet). In Sidney, ice jam flooding occurred from March 18th and got stuck in the area through the end of the month, as nearly all the snowmelt was complete by then, the flow decreased through the area, leaving large ice cakes behind. The peak stage at Sidney was 22.08 feet, and the 2nd highest on record (Flood Stage is 19 feet). The Bureau of Reclamation Buffalo Rapids irrigation station east of Terry was significantly damaged during the ice jam event and a lot of low land flooding, including parks in Glendive and Sidney were impacted.

The record rainfalls in May brought the river levels up high again in May and June, leading to some of the fastest flows recorded on the Yellowstone River (ranking of flow). Glendive flooded again on May 21-26, 2011 with the 10th highest crest at 53.71 feet on May 23, 2011. A record flow of 130,000 crfs also occurred on this date. Sidney flooded between May 22-27, 2011 and had its 3rd highest crest of 21.92 feet on May 25. It also had a record flow of 114,000 cfs on May 30th, with a stage of 19.19 feet. Again, many low lying areas, including parks and ball fields were flooded at this point, but the biggest

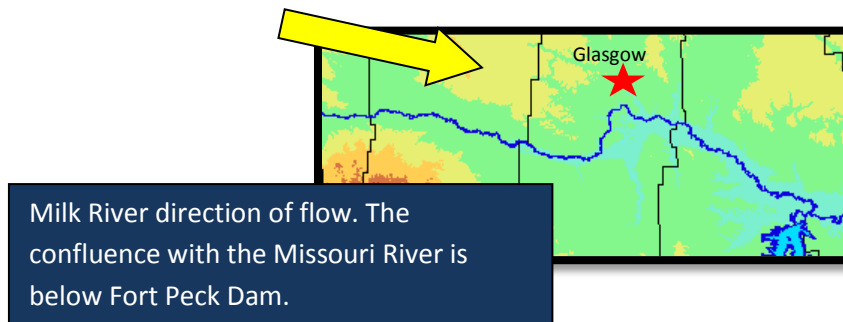
concern was for those who have livestock interests in the area and keeping cattle from getting caught on islands.

Snowmelt flooding from the mountains in June and July have led to higher flows than normal through the summer months, as seen in the image below.



USGS image of flow at Sidney, MT compared to normal. This spring and summer has been well above average.

Milk River:

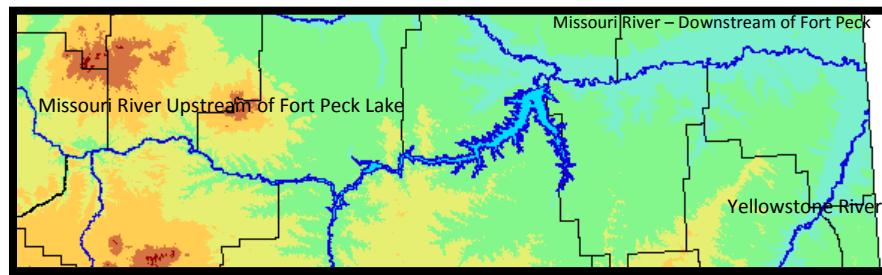


Two significant floods occurred on the Milk River, the first in April as a result of the snowpack melting off, the second occurring from very heavy rainfall in May into June. The gage at Glasgow went above flood stage on April 6, 2011 and remained there except for two brief periods through June 28, 2011. The flood stage is 25 feet, and there were two significant crests on the river, the first on April 16th with a reading of 32.84 feet (tied for 4th highest reading) and the final flood of record crest on June 8, 2011 at 34.08 feet. The previous flood of record was 33.2 feet on April 18, 1952. The river was above flood stage for a total of 69 days, an unprecedented amount of time.

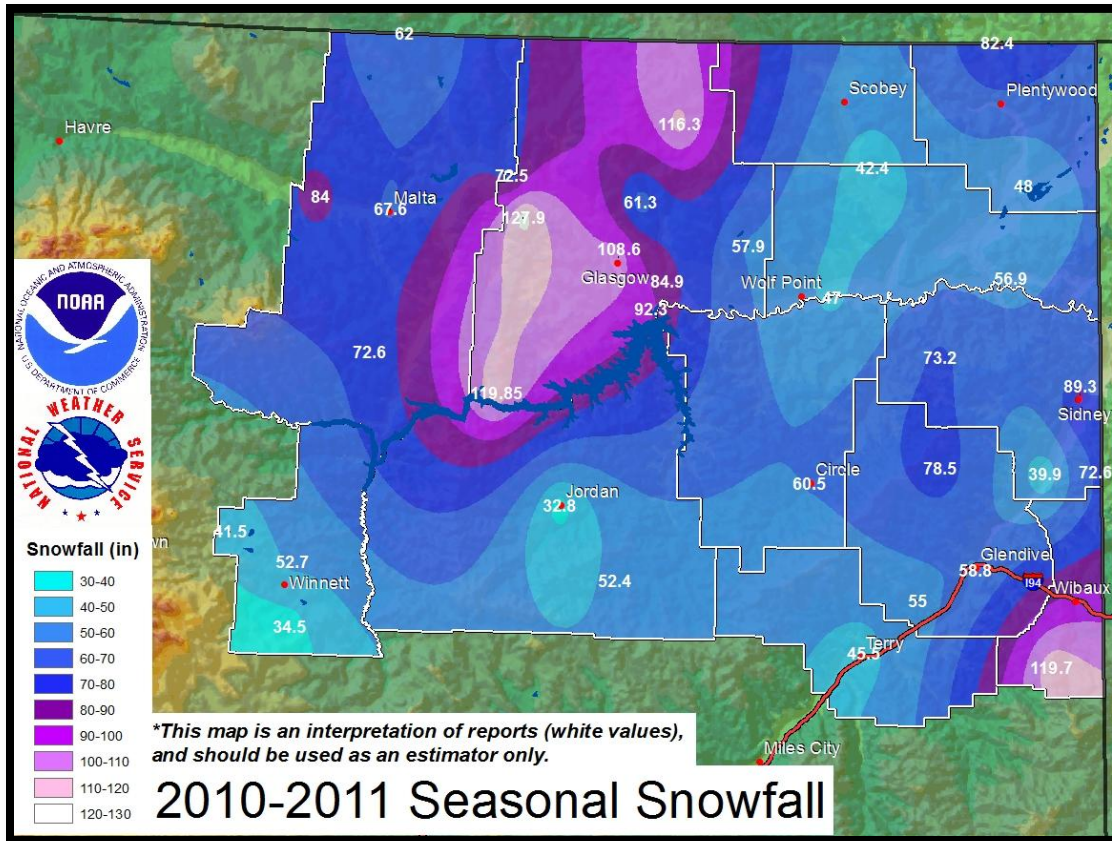
The Milk River, and tributaries such as Beaver Creek, Larb Creek, Antelope Creek, Rock Creek, Cherry Creek, had some form of flooding (minor, moderate or major) from Harlem to the confluence of the Missouri River, a distance of about 130 miles from point to point, or well over 250 river miles.

Significant flash flooding occurred on Cherry Creek and Antelope Creek on June 7th, caused by very heavy rains over a 24 hour period over already saturated grounds. Cherry Creek flooded nearly 3 dozen homes, and while there are no gages on Cherry Creek, local residents reported that was the highest the water had been in over 50 years. The City of Glasgow drainage system was completely overwhelmed, and much of the south side of Glasgow suffered street flooding. Pumps from the city, and on loan from Montana Department of Transportation were not able to keep up with the excess water. The city fire department had to bring in their trucks to pump water away from the hospital and keep it from flooding. The telephone cooperative nearly flooded in their basement as well. This would have meant that no phone, cell phone or data services would have been functioning. All season long, basement flooding from seepage due to the high water table has been a problem.

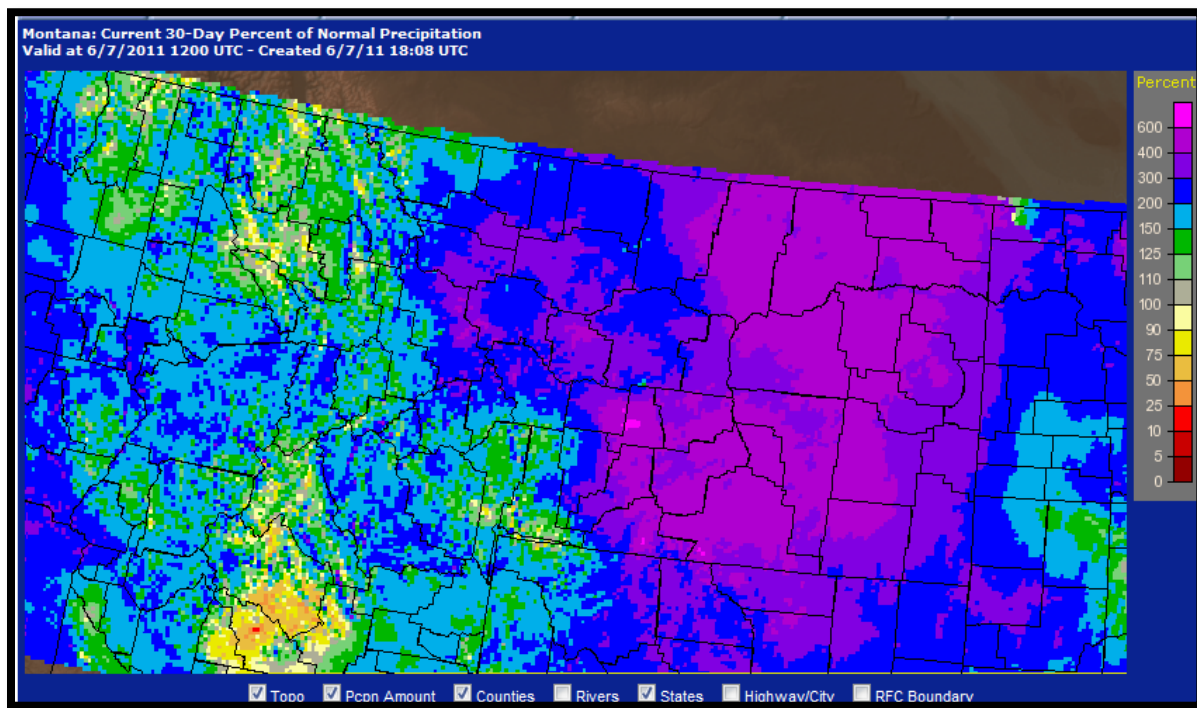
Missouri River below Fort Peck Dam:



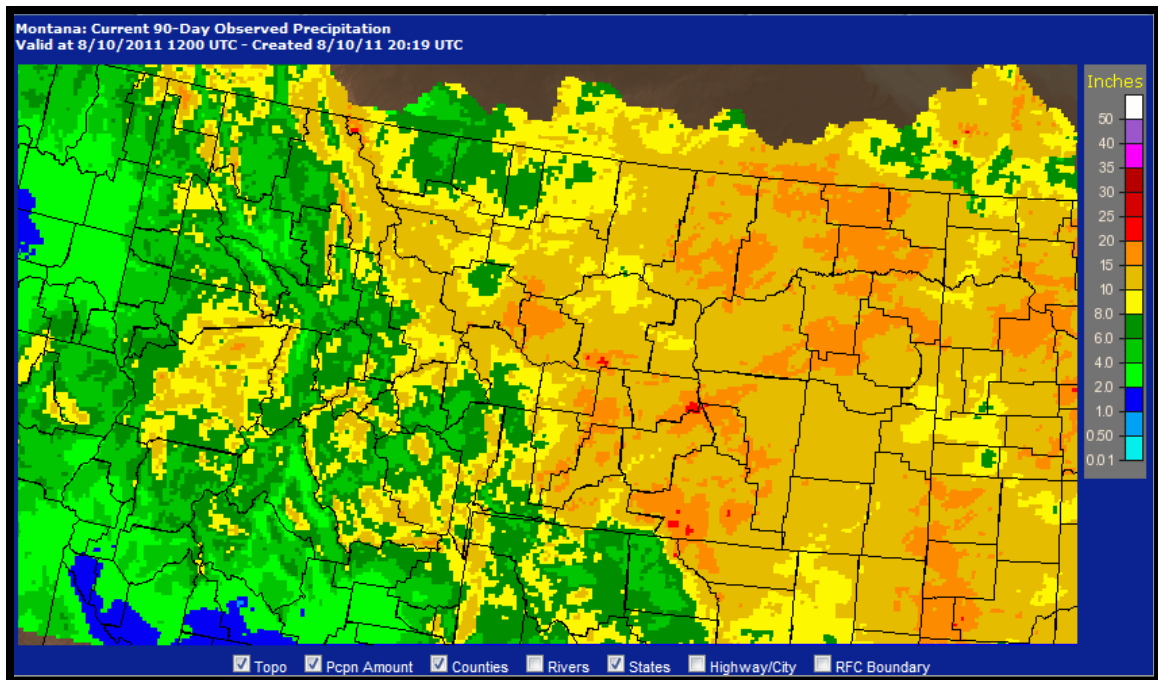
A controlled flood release was started by the USACE due to the excessive snowmelt and rainfall that was draining into Fort Peck from the Musselshell and Missouri Rivers, as well as some of the smaller tributaries around the lake. Fort Peck Lake hit a record pool of 2252.3 feet, which is 2.3 feet above the flood pool of the reservoir. Previous record releases from Fort Peck were just below 35,000 cfs in 1975. This year they had just over 65,500 cfs pouring over the spillway (~50,500 cfs) and through the powerhouses (~15,000 cfs). The increased releases from Fort Peck began on June 7, 2011. Water started flooding downstream of the dam on shortly thereafter, and continued to be above flood stage at Wolf Point until July 1, 2011. Higher than normal releases have occurred through this summer, but the flooding has receded. The major impacts included bank erosion, a main highway south of Poplar being flooded and inaccessible to residents (causing up to an extra 60 miles a day driving), and one home on the Richland County side of the river swept off its foundation.



Northeast Montana Snowfall 2010-2011 (Normal ranges from 30-35")



Montana 30 Day Percent of Normal Precipitation, May 8, 2011 through June 7, 2011



*Montana Rainfall for May 10, 2011 through August 10, 2011.
Normal in eastern Montana for the entire year is from 10-14 inches.*